

LISTING OF THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the above-identified application:

1. (Previously Presented) A control moment gyro (CMG) for use in a space vehicle, comprising:

a rotor adapted to rotate around a first CMG axis;

a gimbal supporting the rotor wherein the gimbal is able to rotate around a second CMG axis not parallel with the first axis;

a mount adapted to be rigidly coupled to the space vehicle;

a base supporting the gimbal wherein the base is able to rotate around a third axis not parallel with the second axis, the base coupled to the mount and rotatable relative thereto;

a plurality of detents formed in the base;

a locking pin fixedly coupled to the mount, the locking pin for locking and unlocking the base by selectively engaging different ones of plurality of detents; and

a drive mechanism coupled to the base for causing the base to rotate around the third axis when unlocked.

2. (Previously Presented) The CMG of claim 1 wherein the plurality of detents is formed in an outer circumferential portion of the base such that each detent in the plurality of detents passes by the locking pin as the base is rotated relative to the mount.

3. (Currently Amended) An apparatus for controlling spacecraft (S/C) momentum using control moment gyros (CMGs), comprising:

a CMG[[an]] array of three or more CMGs including at least first, second, and third CMGs, each the first CMG in the CMG array comprising:

having a rotor adapted to rotate around a first axis[[,]];

a gimbal supporting the rotor wherein the gimbal is able to rotate around a second axis not parallel to the first axis[[,]]; [[and]]

a mount adapted to be rigidly coupled to the S/C;

a base supporting the gimbal and rotor and able to rotate around a third axis not parallel to the second axis, the base coupled to the mount and rotatable relative thereto, the base including a plurality of mechanical locking features;

a plurality of mechanical locking features formed in or disposed on the base of a first CMG in the array of three or more CMGs;

a releasable locking mechanism disposed proximate the first CMG and configured to selectively lock the position of the base of the first CMG in any one of a number of discrete, indexed rotational positions each corresponding to a different mechanical locking feature in the plurality of mechanical locking features locking pin fixedly coupled to the mount, the locking pin for locking and unlocking the base by selectively engaging different ones of plurality of mechanical locking features; and

a drive coupled to the base for causing the base to rotate around the third axis when unlocked; and

a drive associated with the base of the first CMG and able to cause rotation or other movement of the base of the first CMG with respect to the S/C when the locking mechanism is released; and

a controller coupled to the drive and to the locking pin mechanism for selectively locking, unlocking, and rotating the first CMG about the third axis to reorient for receiving reorientation requests directed toward the CMG array and issuing commands to the locking mechanism to release and to the drive to cause movement of the first CMG with respect to the third axis.

4. (Currently Amended) The apparatus of claim 3 wherein the first each CMG in the array of three or more CMGs is a single gimbal axis CMG.

5. (Previously Presented) The apparatus of claim 3 wherein the drive causes rotation of the first CMG around the third axis and translation of the first CMG with respect to the S/C.

6. (Previously Presented) The apparatus of claim 3 wherein the drive is rotationally coupled between the S/C and the base of the first CMG so as to provide rotation of the base around the third axis.
7. (Currently Amended) The apparatus of claim 3 wherein the first CMG further comprises ~~comprising~~ a bearing coupled between the S/C and the base facilitating relative movement thereof.
8. (Cancelled)
9. (Previously Presented) The apparatus of claim 3 further comprising one or more sensors coupled to the first CMG and the controller for determining the amount of relative movement of the base of the first CMG with respect to the S/C.
10. (Original) The apparatus of claim 3 further comprising one or more sensors coupled to the S/C and to the controller for measuring one or more aspects of the S/C condition or attitude.
11. (Previously Presented) The apparatus of claim 10 further comprising a memory coupled to the controller for storing one or more parameters concerning a state of the first CMG.
12. (Original) The apparatus of claim 3 wherein the controller comprises a S/C attitude controller and a CMG controller.
13. (Previously Presented) The apparatus of claim 3 further comprising:
one or more sensors coupled to the first CMG and the controller for determining the amount of rotation of the first CMG about the third axis;
one or more sensors coupled to the S/C and to the controller for measuring one or more aspects of the S/C condition or attitude; and
memory coupled to the controller for storing data concerning the first CMG.

14.-20. (Cancelled)